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1: Prog Neurobiol 1996 Dec;50(5-6):597-653 Related Articles, Books, LinkOut

Development of fetal hippocampal grafts in intact and lesioned hippocampus.

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Functional recovery observed in Parkinson's disease patients following grafting of fetal substantia nigra has encouraged the development of similar grafting therapy for other neurological disorders. Fetal hippocampal grafting paradigms are of considerable significance because of their potential to treat neurological disorders affecting primarily hippocampus, including temporal lobe epilepsy, cerebral ischemia, stroke, and head injury. Since many recent studies of hippocampal transplants were carried out with an aim of laying the foundation for future clinical applications, an overview of the development of fetal hippocampal transplants, and their capability for inducing functional recovery under different host conditions is timely. In this review, we will summarize recent developments in hippocampal transplants, especially the anatomical and/or functional integration of grafts within the host brain under specific host conditions, including a comparison of intact hippocampus with various types of hippocampal lesions or injury. Improvements in grafting techniques, methods for analysis of graft integration and graft function will be summarized, in addition to critical factors which enhance the survival and integration of grafted cells and alternative sources of donor cells currently being tested or considered for hippocampal transplantation. Viewed collectively, hippocampal grafting studies show that fetal hippocampal tissue/cells survive grafting, establish both afferent and efferent connections with the host brain, and are also capable of ameliorating certain learning and memory deficits in some models. However, the efficacy of intracerebral fetal hippocampal grafts varies considerably in different animal models, depending on several factors: the mode of donor tissue preparation, the method of grafting, the state of host hippocampus at the time of grafting, and the placement of grafts within the hippocampus. Functional improvement in many models appeared to be caused partially by re-establishment of damaged circuitry and partially by a trophic action of grafts. However, exact mechanisms of graft-mediated behavioral recovery remain to be clarified due to the lack of correlative analysis in the same animal between the degree of graft integration and behavioral recovery. Issues of mechanisms of action, degree of restoration of host circuitry and amelioration of host pathological conditions will need to be sorted out clearly prior to clinical use of fetal hippocampal transplants for susceptible neurological conditions.